

Guidance Notes: Root Cause Analysis

Definition of Root Cause Analysis

Root Cause Analysis (RCA) is a class of problem solving methods aimed at identifying the root causes of problems or events. The practice of RCA is predicated on the belief that the problems are best solved by attempting to correct or eliminate root causes, as opposed to merely addressing the immediately obvious symptom. By directing corrective measures at root causes, it is hoped that the likelihood of problem recurrence will be minimized.

General principles of root cause analysis

- Aiming performance improvement measures at root causes is more effective than merely treating the symptoms of a problem.
- To be effective, RCA must be performed systematically, with conclusions and causes backed up by documented evidence.
- There is usually more than one root cause for any given problem.
- To be effective the analysis must establish all known causal relationships between the root cause(s) and the defined problem.

General process for performing and documenting an RCA-based Corrective Action

Notice that RCA (in steps 3, 4 and 5) forms the most critical part of successful corrective action, because it directs the corrective action at the root of the problem. That is to say, it is effective solutions we seek, not root causes. Root causes are secondary to the goal of prevention, and are only revealed after we decide which solutions to implement.

1. Define the problem.
2. Gather data/evidence.
3. Ask why and identify the causal relationships associated with the defined problem.
4. Identify which causes if removed or changed will prevent recurrence.
5. Identify effective solutions that prevent recurrence, are within your control, meet your goals and objectives and do not cause other problems.
6. Implement the recommendations.
7. Observe the recommended solutions to ensure effectiveness.

Examples root cause analysis techniques

- 5 Whys
- Failure mode and effects analysis
- Pareto analysis
- Fault tree analysis
- Bayesian inference
- Ishikawa diagram, also known as the fishbone diagram or cause and effect diagram
- Cause Mapping - A problem solving method that draws out, visually, the multiple chains of interconnecting causes that lead to an incident. The method, which breaks problems down specific cause-and-effect relationships, can be applied to a variety of problems and situations

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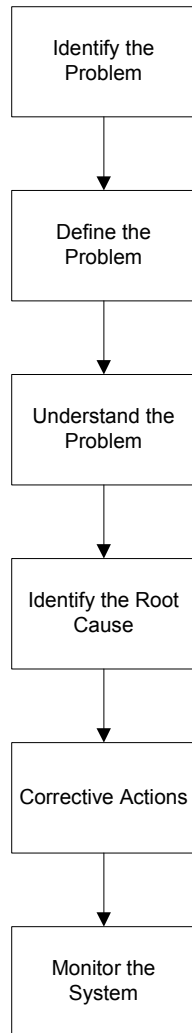
- Barrier analysis - a technique often used in particularly in process industries. It is based on tracing energy flows, with a focus on barriers to those flows, to identify how and why the barriers did not prevent the energy flows from causing harm.
- Change analysis - an investigation technique often used for problems or accidents. It is based on comparing a situation that does not exhibit the problem to one that does, in order to identify the changes or differences that might explain why the problem occurred.
- Causal factor tree analysis - a technique based on displaying causal factors in a tree-structure such that cause-effect dependencies are clearly identified.
- ARCA; Apollo Root Cause Analysis - A unique problem solving process characterized by a structured cause and effect chart known as a Realitychart which allows all problem stakeholders to own the problem and its corrective actions.
- TapRoot - A structured root cause analysis system built around a problem solving process with six embedded techniques to guide investigators beyond their current knowledge to the root causes of human performance and equipment failure related incidents.

Basic elements of root cause

- Materials
- Defective raw material
- Wrong type for job
- Lack of raw material
- Machine/Equipment
- Incorrect tool selection
- Poor maintenance or design
- Poor equipment or tool placement
- Defective equipment or tool
- Environment
- Orderly workplace
- Job design or layout of work
- Surfaces poorly maintained
- Physical demands of the task
- Forces of nature
- Management
- No or poor management involvement
- Inattention to task
- Task hazards not guarded properly
- Other (horseplay, inattention....)
- Stress demands
- Methods
- No or poor procedures
- Practices are not the same as written procedures
- Poor communication
- Management system
- Training or education lacking
- Poor employee involvement
- Poor recognition of hazard
- Previously identified hazards were not eliminated

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Basic Flow



Supporting Information

Non-conformance, Reject,
Customer Complaint,
Improvement Opportunity
etc

Define the actual incident
(e.g. Pilot Hole Missed)

Review the entire process;
create flowchart, sketch
process etc

Use RCA to determine the
Root Cause of the non-
conformance; 5 Whys,
Pareto Analysis, FMEA etc

Implement Corrective
Actions to prevent
reoccurrence: Tooling Jig,
New type of Material, New
Procedure etc

Review Corrective Actions
to ensure effective,
monitor process, added
inspections etc